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B1 Cont'd
insulative tungsten oxides 12c causes whiskers 24 due to a thermal energy that is applied to the tungsten oxide 12c during a heating process of subsequent semiconductor device manufacturing processes. Thus, an electrical short between the gate electrodes adjacent each other can be caused by the whiskers. The whiskers 24 are formed due to an amorphous phase and nucleation sites on the surface of the tungsten oxide 12c. That is, surface mobility of the tungsten oxide 12c having amorphous phase is increased by the thermal energy during a heating process, then the amorphous tungsten oxide 12c is moved toward the nucleation sites and crystallized at the nucleation sites, so that the whiskers 24 are formed. Accordingly, it is required to completely suppress the oxidation reaction of the tungsten during the selective oxidation process - -.

In the Claims

Please amend the claims as follows:

1. (Amended) A method of forming a metal gate electrode having a silicon layer, a conductive barrier layer and a metal layer, the method comprising the steps of:

forming a metal gate electrode pattern comprised of the silicon layer, the conductive barrier layer and the metal layer; and

B2 performing a selective oxidation process to the metal gate electrode pattern in a nitrogen containing gas ambient comprising a non-inert nitrogen containing gas which combines with the metal layer to form a metal nitride during the selective oxidation process.

2. (Amended) The method according to claim 1, wherein the nitrogen containing gas includes one or more gases selected from the group consisting of nitrogen monoxide, nitrogen oxide and ammonia.

B3 4. (Amended) The method according to claim 1, wherein the nitrogen permeates a metal oxide layer which is formed during the selective oxidation process on a surface of the conductive barrier layer and the metal layer, decreases surface mobility of the metal oxide layer,

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and prevents formation of nucleation sites of whiskers on the metal oxide layer.
